

U.S.S.N 09/905,777
Chen
PRELIMINARY AMENDMENT

IN THE SPECIFICATION:

Please amend the specification as follows:

Please amend the paragraph on page 1, lines 4-12, as follows:

This invention relates generally to the field of medicine and pharmacotherapeutics with photosensitizing agents or other energy activated agents. Specifically, this invention relates to methods, compounds, compositions and kits useful for site specific delivery to a lesion target site of a therapeutically effective amount of a photosensitizing agent that is activated by a relatively low fluence rate of light over a prolonged period of time. This invention further relates to the use of either an external or internal light source effective in providing transcutaneous photodynamic therapy as a treatment modality for ~~atherosclerotic~~ atherosclerotic lesions and restenotic lesions in vivo.

Please amend the paragraph on page 4, lines 1-9 , as follows:

Clearly, there would be significant advantage to a completely noninvasive form of PDT directed to subcutaneous vascular lesions which avoids the inadvertent activation of photosensitizer in skin and intervening tissues and also avoids damaging the vessel walls. To date, this feasibility has not been clinically demonstrated nor realized. Only in animal studies utilizing mice or other rodents with very thin cutaneous tissue layers, have very small superficial subcutaneous malignant tumors been treated. These *in vivo* studies do not enable or teach the safe application of transcutaneous light sources to treat ~~atherosclerotic~~ atherosclerotic lesions and restenotic lesions in humans, however.

Please amend the paragraph on page 6, line 27 through page 7, line 2, as follows:

Another embodiment of this invention is drawn to a method of transcutaneous PDT, where the photosensitizing agent is conjugated to a ligand. One preferred embodiment of this invention contemplates a method of transcutaneous PDT, where the ligand is an antibody specific to thick or thin neointimas, arterial plaques, vascular smooth muscle cells and/or the abnormal extracellular matrix of the site to be treated. Other preferred embodiments

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include methods of transcutaneous PDT, where the ligand is a peptide or polymer specific to thick or thin neointimas, arterial plaques, ~~plaques~~, vascular smooth muscle cells and/or the abnormal extracellular matrix of the site to be treated. ~~treated~~.

Please amend the paragraph on page 8, line 32 through page 9, line 11, as follows:

Other preferred embodiments of this invention contemplate that the ultrasonic energy emitting source is external to the patient's intact skin layer or is inserted underneath the patient's intact skin layer, but is external to the blood vessel to be treated. An additional preferred embodiment of this invention provides that the ultrasonic sensitizing agent is conjugated to a ligand and more preferably, where the ligand is selected from the group consisting of: a target lesion specific antibody; a target lesion specific peptide and a target lesion specific polymer. Other preferred embodiments of the present invention contemplate that the ultrasonic sensitizing agent is selected from the group consisting of: [[:]] indocyanine green (ICG); methylene blue; toluidine blue; aminolevulinic acid (ALA); chlorin compounds; phthalocyanines; porphyrins; purpurins; texaphyrins; and any other agent that absorbs light in a range of 500 nm - 1100 nm. A preferred embodiment of this invention contemplates that the photosensitizing agent is indocyanine green (ICG).

Please amend the paragraph on page 9, lines 25-32, as follows:

Additional embodiments of the present invention include compositions of photosensitizer targeted delivery system comprising: a photosensitizing agent ~~agent~~; and a ligand that binds a receptor on the target tissue with specificity. Preferably, the photosensitizing agent of the targeted delivery system is conjugated to the ligand that binds a receptor on the target lesion with specificity. More preferably, the ligand comprises an antibody that binds to a receptor. Most preferably, the receptor is an antigen on thick or thin neointimas, arterial plaques, ~~plaques~~, vascular smooth muscle cells and/or the abnormal extracellular matrix of the site to be ~~treated~~. treated.

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Please amend the paragraph on page 10, lines 5-7, as follows:

Still another preferred embodiment of this invention contemplates that the ligand-receptor binding pair is selected from the group consisting of: biotin-~~streptavidin; streptavidin;~~ and antigen-antibody.

Please amend the paragraph on page 12, lines 9-22, as follows:

"Photosensitizing agent" is a chemical compound which homes to one or more types of selected target cells and, when contacted by radiation, absorbs the light, which results in impairment or destruction of the target cells. Virtually any chemical compound that homes to a selected target and absorbs light may be used in this invention. Preferably, the chemical compound is nontoxic to the animal to which it is administered or capable of being formulated in a nontoxic composition. Preferably, the chemical compound in its photodegraded form is also nontoxic. A comprehensive listing of photosensitive chemicals may be found in Kreimer-Birnbaum, Sem. Hematol. 26:157-73, 1989. Photosensitive compounds include, but are not limited to, chlorins, bacteriochlorins, phthalocyanines, porphyrins, purpurins, merocyanines, psoralens, benzoporphyrin derivatives (BPD) and porfimer sodium and pro-drugs such as ~~delta-aminolevulinic~~ δ -aminolevulinic acid, which can produce drugs such as protoporphyrin. Other compounds include indocyanine green (ICG); methylene blue; toluidine blue; texaphyrins; and any other agent that absorbs light in a range of 500 nm - 1100 nm.

Please amend the paragraph on page 8, line 32 through page 9, line 11, as follows:

Additionally, the present invention is drawn to a method for transcutaneous ultrasonic therapy of tumors in a mammalian subject or patient by first administering to the subject a therapeutically effective amount of a first conjugate comprising a first member of a ligand-receptor binding pair conjugated to an antibody or antibody fragment, wherein said antibody or antibody fragment selectively binds to a target antigen of thick or thin neointimas, arterial ~~plaques, plaques,~~ vascular smooth muscle cells and/or the abnormal

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extracellular matrix of the site to be treated; ~~treated~~; and simultaneously or subsequently administering to the subject a therapeutically effective amount of a second conjugate comprising a second member of the ligand-receptor binding pair conjugated to an ultrasonic sensitizing agent or ultrasonic sensitizing agent delivery system or prodrug, wherein the first member binds to the second member of the ligand-receptor binding pair. These steps are followed by irradiating at least a portion of the subject with energy at a wavelength absorbed by said ultrasonic sensitizing agent or if ultrasonic sensitizing agent delivery system, by the product thereof, wherein said energy is provided by an energy source that is external to the subject; and wherein said ultrasound is at a relatively low intensity rate that results in the activation of said ultrasonic sensitizing agent or prodrug product.

Please amend the paragraph on page 16, lines 20-27, as follows:

This invention further contemplates the use of an energy source, preferably a light source, that is external to the target tissue. The target tissues may include and may relate to the ~~atheroselective~~ atherosclerotic lesions, restenotic lesions and the lesion antigens, per se. These target lesion antigens would be readily understood by one of ordinary skill in the art therefore to include but to not be limited to: tumor surface antigen; tumor endothelial ~~endothelial~~ antigen; non-tumor endothelial antigen; tumor vessel wall antigen; neointimal antigens; arterial plaque antigens; and vascular smooth muscle cell antigens.